mid-grandparent to grandchildren. The coefficient of correlation was $0{\cdot}272 \pm 0{\cdot}12$, and the coefficient of regression $= 0{\cdot}5 \pm 0{\cdot}2$, while, according to theory, they should be 0·3 and 0·6 respectively.

The evidence of these measurements cannot be said to be conclusive, and I am about to test the theory on some other parthenogenetic animal. If, however, this kind of inheritance be found to hold at all generally in parthenogenesis, it would be a fact of very considerable significance, and might conceivably give some insight into the physiological causes of heredity and variation.

"*Onygena equina* (Willd.): a Horn-destroying Fungus." By H. Marshall Ward, D.Sc., F.R.S., Professor of Botany in the University of Cambridge. Received April 6,—Read May 4, 1899.

(Abstract.)

The genus *Onygena* comprises half a dozen species of fungi, all very imperfectly known, remarkable for their growth on feathers, hair, horn, hoofs, &c., on which their sporocarps appear as drum-stick shaped bodies 5—10 mm. high. A cow's horn, thoroughly infested with the mycelium of the present species, yielded material for the investigation, and the author has not only verified what little was known, but has been able to cultivate the fungus and trace its life-history, neither of which had been done before, and to supply some details of its action on the horn.

The principal new points concern the development of the sporophores, which arise as domed or club-shaped masses of hyphæ and stand up into the air covered with a glistening white powder. Closer investigation shows this to consist of chlamydospores, formed at the free ends of the up-growing hyphæ. Their details of structure and development are fully described, and their spore nature proved by culture in hanging drops. The germination, growth into mycelia, and peculiar biology of these hitherto unknown spores were followed in detail, and in some cases new crops of chlamydospores obtained direct in the cultures.

When the crop of chlamydospores on the outside of the young sporophore is exhausted, the hyphæ which bore the spores fuse to form the peridium clothing the head of the sporocarp, and peculiar changes begin in the internal hyphæ below.

Minute tufts or knots of claw-like filaments spring from the hyphæ forming the main mass of the fungus, push their way in between the latter, and so find room in the mesh-like cavities. Here the closely segmented claws form asci—they are the ascogenous hyphæ—and the

details of development of the asci, their nucleated contents, and the spores are determined. As the spores ripen, the asci, which are extremely evanescent, disappear, and in the ripe sporocarp only spores can be seen lying loose in the meshes of the gleba. The ascomycetous character of the fungus is thus put beyond question, though the peculiar behaviour of the developing ascogenous tufts at one time rendered it questionable whether the older views as to the relationships were not more probable.

No one had hitherto been able to trace the germination of these ascospores—the only spores known previously—and De Bary expressly stated his failure to do it. The author finds that they require digesting in gastric juice, and so in nature they have to pass through the stomach of the animal. By using artificial gastric juice, and employing glue and other products of hydrolysis of horn, the details of germination and growth into mycelia, capable of infecting horn, were traced step by step under the microscope and fully described.

No trace of any morphological structure comparable to sexual organs could be discovered, though many points suggest the alliance of this fungus with Erysipheæ and Truffles.

The author also found that similar digestion promotes the germination of the chlamydospores, and in both cases has not only traced the germination step by step, but has made measurements of the growth of the mycelium, induced the formation of chlamydospores on the mycelium again, and by transferring vigorous young mycelia to thin shavings of horn has observed the infection of the latter.

It thus becomes evident that the spores of *Onygena* pass through the body of an animal in nature, and, as might be expected from this, extract of the animal's dung affords a suitable food medium to re-start the growth on horn. Probably the cattle lick the *Onygena* spores from their own or each other's hides, hoofs, horns, &c., and this may explain why the fungus is so rarely observed on the living animal: it is recorded from such in at least one case however.

Very little is known as to the constitution of horn, and some experiments have been made to try to answer the question—what changes the fungus brings about. The research has also obvious bearings on the question of the decomposition of hair, horn, feathers, hoofs, &c., used as manure in agriculture. Although a bacterial decomposition of hoof substance is known to the author, special investigation of the question showed that in the present case no symbiosis between bacteria and the *Onygena* exists.

For the details as to the literature, the discussion as to the systematic position of *Onygena*, the experimental cultures, growth measurements, and the histology, the reader is referred to the full paper, which is illustrated by plates and numerous drawings.